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A CAPABILITY APPROACH TO CHILD GROWTH

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ABSTRACT

For decades, child growth monitoring has been performed by measuring anthropometric indicators and comparing them against universal standards. Since the 1970s various efforts have been made to expand the focus from anthropometric indicators and include broader contextual and structural factors that influence children's growth. However, those efforts have so far not led to changes in the dimensions that are taken into account in child growth monitoring. In this paper we introduce the Capability Approach as an evaluative framework for growth monitoring of children under five years old. Applying the CA helps focusing on opportunities that are available to children to choose from in order to achieve healthy growth. By doing so, it helps analyzing their available resources (endowments), as well as the mechanisms that could enhance or restrict their access to those resources (conversion factors). In addition, children's growth could be assessed alongside the caregivers' capabilities that children rely on to achieve their full growth potential. We present a child growth evaluation framework as well as an analytical matrix, which has different categories of dimensions that interact with each other and ultimately shape children's growth. The framework is a flexible tool, and is thus broad enough to accommodate contextual differences.

***Key words**: child growth, growth monitoring charts, capability approach, multidimensional measurement*

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1. INTRODUCTION

For decades, child growth monitoring has been performed by measuring anthropometric indicators and comparing them against universal standards. Although this vision of "universal body outcomes" in child growth has been central in the studies and the practice of nutrition, it may not fully capture the complexity of the life of the child and of his/her specific needs and potential performance (Piwoz, Sundberg et al. 2012; Stewart, Iannotti et al. 2013). Children may need access to different types and different amounts of capability inputs (policies, resources, food, changes in social norms, or infrastructure) to achieve the same levels of wellbeing. This variation in specific needs challenges the way child growth has been measured up to now. If child growth is complex and multidimensional, new theoretical ideas and measures that embrace this complexity are necessary (Haisma, Yousefzadeh et al. 2017). The aim of this paper is to examine this complexity by introducing a conceptual framework based on the Capability Approach (CA) and operationalizing it throughout a matrix in order to generate a series of dimensions for assessing child growth. These new perspectives and concepts should provide new insights for policy-making. It is important to point out that because the CA perspective starts with the assumption of the uniqueness of the child (acknowledges that every child has distinct features and therefore the CA refrains from generalization, as such starts with human diversity), the intersectionality of a range of characteristics and processes have to be taken into account. Sen (1999) has stated that human diversity is a value per se. In this paper, we define child growth as a multidimensional concept, and discuss how this multidimensionality applies to both input and output levels. We have developed our framework to be applicable to children under the age of five because the period between 0-5 is crucial in shaping children's opportunities in achieving optimum growth.

The CA is a broad normative framework (Venkatapuram, 2011) for the evaluation of an individual's quality of life that can be used to analyze the practical opportunities people have to achieve wellbeing (Robeyns 2006, 2011; Chiappero-Martinetti, Venkatapuram 2014). Since its introduction, the CA has been used in many different areas of research and policy. The CA is thus a paradigm that is flexible enough to accommodate a wide range of topics (Robeyns 2006). The overall wellbeing of different population groups (e.g., children, women, and people with disabilities) is one of the many areas that has been examined through the application of the CA. Using this approach, researchers can examine what people are actually able to do or to be, as it allows them to analyze the required resources (endowments) as well as the mechanisms that could enhance or restrict access to those resources (conversion factors). Thus, it provides crucial information for making judgments about different aspects of wellbeing (e.g., health) and social policies (Robyens 2007, 2011, Chiappero-Martinetti, Venkatapuram 2014). Increasingly, the CA is applied in the evaluation of different themes in children's lives. While some studies have examined broad aspects of children's beings and doings, such as poverty, wellbeing, happiness, and development (Di Tommaso 2006; Sen 2007; Di

Tommaso 2007; Clark and Eisenhuth 2010; Dixon, Nussbaum 2012; Anand and Roope 2013; Yousefzadeh 2013); others have evaluated more specific areas of children's wellbeing, like disability, participation and agency, child labor, and child nutrition (Biggeri and Anich 2009; Biggeri, Ballet, et al. 2011; Trani, Bakhshi, et al. 2011; Sassi 2013). Some scholars have paid close attention to the conceptualization of the CA specifically for children (Sen 2007; Andresen and Fegter 2011; Biggeri and Santi 2012; Biggeri and Karkara 2014, Fegter and Richter, 2014; Domínguez-Serrano and Del Moral Espìn, 2016), while others focused more on the operationalization level and the subsequent empirical analysis (Addabbo, Di Tommaso 2007; Anand and Roope 2013; Clery, Tsang, et al. 2014).

The purpose of the paper is embedded in a broader project on "normative indicators of child health and nutrition – one size fits all?[1]" The project aims to develop indicators of child growth that take into account biological, sociological, and anthropological dimensions. In the next section, we provide some background information on the development of growth charts, and the advantages and disadvantages of growth monitoring practices. We then describe some of the existing efforts that focus on multidimensional measurements of children's development and wellbeing. Although the primary focus of this paper is on "child growth", in order to gain a more detailed understanding of efforts to use a multidimensional approach to measuring child development and wellbeing, it will be helpful to draw upon the experiences of these existing initiatives. We then explain how the CA can be applied to child growth, and present a matrix of variables that includes different dimensions that contribute to child growth, namely endowments, conversion factors, capability sets, and agencies.

2. BACKGROUND: CHILD GROWTH MONITORING

UNICEF has provided some specific definitions of child growth and child development: growth is defined as "the change in weight, height, and circumference of head" (UNICEF 2013, p. 2), and child development is defined as "the process of change in which a child comes to master more and more complex levels of physical activity, thinking, feeling, communicating and interactions with people and objects. This is sometimes expressed as physical, cognitive, emotional and social development" (Ibid). The above definitions suggest that from UNICEF's point of view, the term "growth" refers to physical changes, while the term "development" refers to various dimensions of a child's life. By contrast, in some WHO documents, references to child growth, growth charts, and the practice of growth monitoring go beyond physical changes. For instance, in some sources growth charts are introduced as a tool that could indicate the

[1] The project is run at the Department of Demography, the University of Groningen, funded by NWO/WOTRO project W01.70.300.002, under the umbrella of IUNS Task Force "toward multidimensional indicators of child growth and development.

physiological needs for growth (Anand, and Roope, 2013; Victora 2004, WHO 2007), whereas in other sources growth charts are referred to as a means of monitoring children's overall development (WHO 2007, Onis, Garza, et al. 2007, Zorlu 2011). Moreover, in its Global Database on Child Growth and Malnutrition, the WHO refers to "growth assessment" as an effort that helps evaluate the health of an entire population (Onis and Victora 2004) (WHO 2007): "Growth assessment thus not only serves as the means for evaluating the health and nutritional status of children but also provides an indirect measurement of the quality of life of an entire population" (Onis and Blössner 2003, p. 3).

The practice of child growth monitoring has been examined and discussed since the 1970s, with a number of studies showing that the use of growth charts in growth monitoring have both advantages and drawbacks. One important strength of relying on anthropometric indicators for child growth monitoring is that they are easy to understand and simple to use for health care providers in both urban and rural settings (Onis, Onyango et al. 2006). Monitoring a child's growth does not require the use of complex measurement devices, calculation methods, inferences, and interpretations; and these indicators are easy to communicate and explain to a child's parents and care providers[2]. Moreover, growth monitoring practices are performed in health network facilities nearly everywhere in the world. A crucial advantage of applying these growth charts through health networks is that even the poorest communities are likely to have health facilities or arrangements of some kind that provide primary health care services, albeit with varying degrees of sophistication and quality. Thus, even in the most deprived communities, the use of health care facilities for assessing child growth might be more effective in terms of outreach and coverage than a reliance on other platforms (e.g. community centers, clinics, or daycares)[3]. Finally, as the indicators are measured globally and in large-scale programs (with or without support from international organizations), they provide a solid basis for global comparisons. The collection of globally comparable data makes it possible to examine inequalities and gaps between and across regions and countries. WHO's reports indicate that in 2003 alone, 154 countries were using growth charts in their child growth/nutrition programs (Mangasaryan, Arabi, et al. 2011).

However, using anthropometric indicators alone to monitor children's growth also has some drawbacks. First, while these indictors provide a partial answer to the "who" question, they do not provide any further indications about the socioeconomic or cultural characteristics of the children, their caregivers[4], or their

[2] Although some literature has suggested that the interpretation of the charts and the communication with caregivers during growth monitoring practices is not always effective (Gerein, Ross 1991; Roberfroid, Pelto, et al. 2007; Ben-Josep, Dowshen, et al. 2009), the tool itself and the anthropometric measures do not impose any limitations.

[3] It is also important to keep in mind that in some rural areas, health facilities might be far away, and thus difficult to get to (Ashworth, Shrimpton, et al. 2008).

[4] In this paper, we make several references to 'caregivers,' which could include biological or non-biological parents, same sex or heterosexual couples, grandparents or other relatives, who contribute to providing direct care to the child (depending on the culture and context). Providing further analysis on the nuances that are involved in any form and

communities. In other words, these indicators do not describe who the person behind numbers actually is. It has also been pointed out that reliance on anthropometric measures of growth does not address the "why" question. The growth monitoring charts currently in use are not designed to identify the causes of malnutrition, and do not provide any information as to why children are malnourished (Haisma, Yousefzadeh et al. 2017). Thus, while they are important tools for identifying inequalities (i.e., who is exhibiting healthy growth and who is not), they lack important details that could be informative in policy-making processes aimed at allocating resources more equitably and reducing inequalities. It should be noted that substantial efforts have been made to identify the root causes of malnutrition and stunting through the analysis of the social determinants and the underlying socioeconomic and political factors (Martorell 1985; Jolly 1991; Jonsson 2003; Stewart, Iannotti, et al. 2013; Victora, Aquino, et al. 2011; Black, Victora, et al. 2013). Nevertheless, the monitoring tool (growth charts) and its indicators cannot fully address the why question because they rely solely on information on weight and height for growth measurement. We argue that to answer the why question, it is necessary to include additional attributes that shape and define children's growth (Haisma, Yousefzadeh, et al. 2017).

In the next section of this paper, we introduce important initiatives that take multidimensional approaches to child development. Some of these approaches apply multidimensionality in their interventions and in their measurement techniques, while others mainly focus at the operational level, mainstreaming a multisectoral approach in their interventions in order to address simultaneously different dimensions of child development. As we mentioned above, those efforts have inspired us in our efforts to apply the CA to child growth.

3. EXISTING EFFORTS TO APPLY MULTIDIMENSIONAL APPROACHES TO EARLY CHILDHOOD DEVELOPMENT

Over the past decade, international organizations have introduced programs and policies that apply multidimensional approaches to different concepts of children's lives, including Healthy Growth, Early Childhood Development (UNICEF, WHO, the World Bank, UNESCO), and Social Determinants of Health (WHO)[5]. In this section, we briefly introduce those initiatives. It is important to note, however, that the concept of multidimensionality that we use in the following examples could refer to either inputs (resources)

shapes of families and caregivers, or the fact that often, mothers might be the main caregiver, crucial as it is, is beyond the scope of this paper.

[5] It is not our aim in this section to provide definitions for those concepts, as doing so is beyond the scope of this paper. Thus, we merely refer to those initiatives to acknowledge the previous attempts that have inspired our framework.

or outcomes. Multidimensionality at the level of *input* refers to resources that could be assigned to one of four levels: child, household, societal, or global. A child's genetic background and birth weight are two examples of child-level factors that have been studied repeatedly, and that are assumed to influence child outcomes in areas such as cognitive growth, emotional development, and educational achievement (Fox and Calkins 2003; Saigal, Hoult et al. 2000; Saigal, Stoskopf et al. 2006; Rueda, Rothbart et al. 2005; Aarnoudse-Moens, Weisglas-Kuperus, et al. 2009; Martorell, Zongrone 2012). References to genetic influences on child development are not homogenous, and scholars' judgments differ considerably on this point. Increasingly, studies are focusing on the inseparability of genetic and environmental factors (Fox, Calkins 2003; Phillips, Shonkoff 2000; Shonkoff, Phillips 2000; Olson 2002). Additionally, as claimed by Venkatapuram "social determinants influence genetic endowments" (Venkatapuram, 2011, p. 71). Finally, it is important to note that WHO's report on social determinants of health, provides a strong emphasis on the role of societal factors in defining and shaping individual characteristics, including biology and genes (WHO 2008, Venkatapuram 2010). The report argues that individual's day to day experiences of living (such as where they born, how they live, who they get married to, or which country to live) are determined by their social factors and settings (Venkatapuram 2010). Therefore, we need to be cautious in defining and interpreting the input indicators including (but not limited to) the biological and genetic factors, or mother's age.

Another category of input dimensions that are assumed to influence child development are monetary or nonmaterial resources at the household level. For instance, links have repeatedly been made between children's development outcomes in areas like vocabulary development, cognitive growth, and behavior on the one hand; and parents' socioeconomic status and health on the other (Campbell, Ramey et al. 1994; Barnett 1995; Peisner-Feinberg, Burchinal, et al. 2001; Hoff 2003; Pan, Rowe et al. 2005; Ramchandani, Stein et al. 2005; Loeb, Bridges, et al. 2007). The connection between structural and system-level inputs and child development have also been established, and it is widely assumed that child growth is influenced by factors like social protection, ethnicity, human rights issues, cultural practices, and gender issues (Dubois and Girard 2006; Currie, Molocho et al. 2007; Marmot, Friel, et al. 2008; Stewart, Iannotti et al. 2013; Bell, Donkin, et al. 2013). Finally, there are the global-level factors that affect individual households and societies (Jolly 1991; Stewart 1991; Jonsson 2003; Stewart, Iannotti et al. 2013). It is also crucial to acknowledge that some of the above mentioned input factors should be considered in connection with other factors at different levels. For instance, the socioeconomic status of a household is determined in the context of the welfare and economic system and policies of the country in which it is located.

Below, we summarize the existing efforts that define children's health, growth or development as a multidimensional concept (at the input, process or output levels).

One of the earlier frameworks is that proposed by UNICEF for the causes of malnutrition (as opposed to healthy growth) in children (UNICEF 1990). The framework introduces various levels (*input and process*)

for assessing and analyzing the causes of malnutrition. The basic causes level focuses on the contextual socioeconomic and political factors that contribute to malnutrition, including the lack of capital (human, financial, physical, social, and natural). The underlying causes level focuses on the macroeconomic factors and income poverty. The household- and community-level causes level focuses on causes that are in turn affected by underlying causes, include food insecurity, inadequate care, and a lack of health services. The immediate causes of malnutrition are identified as disease and inadequate dietary intake (UNICEF 1990). More recently, the WHO has further built on UNICEF's framework by introducing a conceptual framework for understanding and analyzing stunting with an emphasis on complementary feeding (Stewart, Lannotti, eat al. 2013). The WHO's framework focuses to a greater extent than UNICEF's framework on the common and interrelated causes of children's "healthy growth and development," and highlights the importance of transdisciplinary actions for addressing the proximal causal factors, including complementary feeding.

Among the major initiatives that have introduced multidimensionality at the intervention level is the Early Childhood Development (ECD) initiative of the World Bank. The bank's early childhood initiatives started in the 1970s. By 2005, the World Bank had provided loans to 52 countries exclusively for ECD projects, and 30 countries had ECD policies in place with the bank's support (Young 2002; Engle, Black et al. 2007). The World Bank usually collaborates with other specialized agencies, particularly with UNICEF and the WHO, in implementing the ECD programs. Broadly speaking, the Bank's ECD programs focus on three dimensions: physical, cognitive, and socioemotional (Young 1995); and introduce milestone indicators and supports for child development[6]. The bank provides a detailed list of *input* and *output* indicators for different age categories and development milestones, and of the forms of support needed to reach these milestones (Swaminathan 1990; UNICEF 2008; Anghelescu, Boca, et al. 2010). For instance, a child begins to smile, turn towards sounds, and discover his/her feet and hands before the age of three months. To reach these milestones, s/he needs to be protected from physical danger, and have adequate nutrition, health care (immunization, oral rehydration therapy, and hygiene), and stimulation (Ibid).

UNICEF also invests heavily in Integrated Early Childhood Development (IECD) programs. UNICEF's IECD projects cut across various dimensions of children's lives, and are particularly concerned with the first eight years of child development (UNICEF 2008). UNICEF's IECD pays close attention to both *input* and *outcome* levels. At the same time, UNICEF has increased its focus on the importance of structural and social inputs in determining children's outcomes. At the input level, the IECD brings together two important areas—i.e., home environment and early childhood care and education—while the development status of the child is the outcome. Accordingly, UNICEF has created an index of development outcomes that

6 http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTCY/EXTECD/0,,contentMDK:20260280~menuPK:524346~pagePK:148956~piPK:216618~theSitePK:344939,00.html

combines literacy-numeracy, physical development, social-emotional development, and learning (UNICEF 2008).

In an effort to improve education outcomes for children, UNESCO started the Holistic Integrated Early Childhood Development Index (HIECDI) initiative in 2012. Various working groups assisted UNESCO in identifying the core dimensions that contribute to better education outcomes in children. The core dimensions are: health, nutrition, education, parent support, equity and social protection, and the alleviation of poverty. To examine children's outcomes, UNESCO applies an ecological framework that includes the family context, programs and services, and policies and laws (UNESCO 2014). Various indicators are gradually introduced under the six core dimensions of the HIECDI (UNESCO 2014). The core dimensions elucidate a detailed list of factors at both the input and the outcome levels. The main difference between UNESCO's outcome dimensions and those of UNICEF and the World Bank is that UNESCO provides a more general list that is not disaggregated by age groups. For instance, UNESCO refers to general development milestones in areas related to "motor development" or "communication;" (UNESCO 2014) whereas UNICEF and the World Bank refer to more specific steps, such as "rolling over" or "sitting when propped".

In addition to the abovementioned efforts, the WHO's Commission on Social Determinants of Health (SDH) seeks to maximize children's outcomes by paying particular attention to equity at the start of life, and takes a comprehensive approach to early childhood development. The SDH examines various levels of inputs in an effort to improve early childhood development outcomes; i.e., at the level of the individual child, the family, the neighborhood, and the society. WHO introduced a bioecological framework similar to that of UNICEF that focuses on the spheres of influence on early childhood development (Irwin, Siddiqi, et al. 2007; WHO 2008). Irwin (Siddiqi, et al. 2007) proposed four key criteria for defining the output dimension of early childhood development. First, the dimensions should encompass key areas of early childhood: health, wellbeing, learning, and behavior throughout the life course. Second, there should be a common understanding of what these dimensions are at the international level, and they should be defined and measured in the same way globally. At the same time, it must be recognized that these dimensions differ depending on the context. Third, the global context and the conditions in which children are living must be taken into account. Finally, the information collected needs to be valid and comparable (Irwin, Siddiqi, et al. 2007). In applying the Social Determinants of Health as an approach to early childhood development, detailed attention is also given to the input dimensions at the household, community, and global levels. There is also extensive literature examining the underlying social factors, particularly the maternal factors, that contribute to child growth and child nutrition (Martorell 1985; Smith, Haddad 1999; Smith, Ramakrishnan, et al. 2003; Martorell, Zongrone 2012; Victora, Adair et al. 2008; Black, Victora, et al. 2013). Multisectoral interventions for healthy growth apply a similar approach in advocating for complementary

interventions to address child nutrition. They combine nutrition-specific interventions with nutrition-sensitive programs in order to address the root causes of malnutrition (Armstrong, Doyle et al. 2006; Casanovas, Lutter, et al. 2013; Ruel, Alderman et al. 2013).

4. A CAPABILITY FRAMEWORK TO CHILD GROWTH

As we pointed out above, the CA approach has not previously been operationalized to analyze child's growth, even though it is increasingly being applied to measure children's wellbeing and children's understanding of what constitutes a good life (Biggeri et al. 2006; Andresen and Fegter 2011; Domínguez-Serrano and Del Moral Espìn 2016). The CA focuses on practical opportunities and functionings of healthy growth. Functionings are the achieved beings and doings of a person, for example being well nourished, or being mobile. Capabilities on the other hand are "the opportunity to achieve valuable combination of human functionings" (Sen A. , 2005, p. 153). As such, capabilities imply an element of freedom in choosing one type of functioning over another and could be considered as a set of vectors of different functionings (Sen , 1992) (Robeyns, 2003). In other words "capability reflects a person's freedom to choose different ways of living" (Sen A. , 2003, p. 43). Sen suggests that capabilities hold two elements of freedom: opportunities (capabilities) and processes (Sen A. , 2005). For instance, in order to feed the child, the caregiver has to have different capabilities for feeding to choose from (e.g. capability to breastfeed or capability to bottle feed). The caregiver also has to have the freedom to choose from those capabilities. If a working mother is able and willing to breastfeed but she cannot pump at work (she has to be constantly on her work and is not allowed to take the time when she needs to pump) she has the substantive opportunity (capability to breastfeed) but does not have the process opportunity (or freedom).

Often, we don't have enough information to enable us to understand those nuances and evaluate mother's capability (ability + freedom) to feed the child. Therefore, usually, we evaluate functionings rather than capabilities. Nevertheless, we believe that once real opportunities (capability and process) for healthy growth are available, often differences between the achieved functioning among certain groups of children could be a good proxy to differences in their capabilities (figure 1). The reason being that, it would be hard to think of circumstances where in the presence of opportunities (capabilities) and freedom of choice, caregivers in certain groups (e.g. disadvantaged regions or certain social classes) choose to have less optimal growth for their children and play their agency in that direction. Robeyns (2011) and Phillips (2002) refer to similar arguments in their defense of choosing achieved functionings over capabilities in the assessment of gender inequality. They suggest that in the evaluation of group wellbeing (e.g. ethnic or gender), differences in achieved outcomes are good indications of differences in opportunities unless it could be

justified as to why certain groups of population (women in their case) systemically choose to achieve less from the same given opportunities (Phillips 2002; Robeyns 2011). Furthermore, although the CA emphasizes the importance of self-determination, there are some cases where the more appropriate space for evaluation is functionings rather than capabilities. For example, when it is plausible to assume that no one wants to be deprived in a certain capabilities, such as bodily integrity, or when individuals have limited capacity to make complex choices (such as young children or severely mentally disabled persons) (Sen, 1992).

In applying the CA to child growth, we include the Human Rights Based Approach as well as the ecobiological perspective in referring to caregivers and society. The Human Rights Based Approach and the CA are complementary as the CA offers a framework for localizing and securing human rights (Biggeri and Karkara, 2014). The Convention on the Rights of the Child on the other hand refers to duty bearers and right holders. For very young children in particular, the role of the duty bearers (caregivers and society) is stronger. In addition, referring to the Convention on Elimination of all forms of Discrimination Against Women, allows us to reflect carefully on the gendered roles and norms that need to be scrutinized.

Adding the ecobiological systems theory of human development (Bronfenbrenner and Ceci 1994; Bronfenbrenner and Morris 1998; Bronfenbrenner 2007) to the CA offers a solid framework to unpack the interactions between the child's development and his/her immediate household, community, and society at large (Trani, Bakhshi et al. 2011).

In this paper we define a child's healthy growth as "the process of continuous physical, psychological and social change that builds a child's capacities to maximize life chances at the individual and societal level" (Haisma, Yousefzadeh et al. 2017). The capability of a child to grow adequately depends on several factors and actors, and has an intrinsic and an instrumental value in relation to other functionings and capabilities, such as the child's capability to be adequately nourished, and to have body integrity and body health.

Our definition of child growth has adopted several concepts from the abovementioned literature. First, we define child growth as a multidimensional concept. In our approach, multidimensionality applies to input, process and outcome levels. This marks a difference between this approach and others which use contextual variables as explanatory variables, rather than including them within the multidimensional outcome measure (Haisma, Yousefzadeh et al. 2017)

Second, we focus on the child as the unit of analysis, but also pay close attention to his/her caregivers, the society in which he/she lives, and global conditions.

Third, and related to the previous concept, our understanding of children and their growth is sensitive not just to contexts and geographies, but also to cultures (Haisma, Yousefzadeh et al. 2017). We acknowledge that family, motherhood and childhood are all socially constructed and affected by social norms. For instance, often, the social order privileges the two parent heterosexual families (McDermott & Graham,

2005). Another example is the age of the mother, where early motherhood is not a neutral terminology and is often linked with dependency, unemployment or social housing. The role of social background and mechanisms whereby younger mothers' experiences are affected by race, social class and social inequalities are often overlooked (Geronimus, 1996) (McDermott & Graham, 2005) (Barcelos & Gubrium, 2014)

In defining and operationalizing our approach, we refer extensively to studies that have applied the CA to concepts related to children (Biggeri et al. 2006; Di Tommaso 2006; Sen 2007; Di Tommaso 2007; Biggeri and Anich 2009; Clark and Eisenhuth 2010; Biggeri, Ballet, et al. 2011; Dixon and Nussbaum 2012; Anand and Roope 2013).

Trani, Bakhshi et al. (2011) first applied the CA to child wellbeing. Their work presents some concepts that are important to our analysis, as they sought to combine the CA and the ecobiological perspective. This combined approach was further developed by Ballet, Biggeri et al. (2011), who introduced the concept of evolving capabilities. The child capabilities to grow depend on the continuous combination of capacities and opportunities, as well as on the agency of the children and their caregivers in a specific context in which the child lives and interacts, and which are influenced by micro, meso, and exo systems. It is important to note that very young children have very limited agency to practice (e.g. crying when they are hungry or refusing to eat). Nevertheless, caregivers' agency and choices that they make are important factors to consider when analyzing the functionings of healthy growth that belong to the child and caregivers.

The factors at the micro, meso, and exo system levels play key roles in furnishing the factors that convert the inputs available in the community (goods/services/resources) into child's capabilities. Then, the process of capabilities development is not continuous nor immediate, but it is the product of the constant interplay between child's achieved functionings, external factors (micro, meso and exo) and child's agency. Child's agency is not constant either but it is repeatedly challenged by the child's lived experiences and evolving capabilities. The concept of evolving capabilities can be captured in an ecobiological system in the following simplified diagram (figure 2) below.

< Figure 1>

As represented in figure 2, the CA, rights based approach and the bioecological systems theory can be combined in order to present a conceptual framework that brings together the different insights. In both CA and bioecological approaches, the child is at the center of the process, drawing his/her entitlements from the microsystem in which s/he lives. Following Bronfenbrenner (1994, 1998), we assume that a micro system is determined not by territorial proximity, but by the degree to which the child can participate given his/her age and maturity. Thus, that micro system mainly includes the child's family members, caregivers, school teachers, and peers. The higher layer is the meso system that encompasses all of the processes and linkages

between two or more settings that include the child. For example, the meso level includes the relationships between caregivers and teachers, or between doctors and caregivers. The exosystem encompasses all of the processes and linkages that occur across two or more settings. These processes do not always involve the child directly, but they influence his/her development. An example is the relationship between labor market regulation and parenting (e.g. parent workplace schedules). Finally, the macro system covers belief systems, social norms, culture, and also institutional settings comprising rights. The macro system influences the child's development because it affects the micro systems with which the child has direct relationships. What the child especially at early age is able to achieve is determined in large part by the actions of the caregivers. According to the bioecological theory, development is a process of change and permanency centered on the interaction between the individual and other agents. The process of evolving capabilities involves departing from an initial set of achieved functionings. At this point the extent to which the child is able to draw from the entitlements available in the territory where s/he lives depends on the characteristics of the actors with whom the child has direct interactions: i.e., the caregivers. Whether the caregivers have access to certain resources—including shelter, sanitation, and sources of information—determines the child's opportunities. This in turn depends on the interaction the different systems and interactions among them.

This relation of dependency is called external capabilities. Basu and Foster (1998) coined this word to describe the circumstances in which a person, in this case the child, relies on other people's capabilities (and on their agency and choice) in order to achieve additional functionings (e.g. child's health) (and then Foster and Handy 2008). As the child – even at early age –is already capable of influencing his/her proximate world, the choice made by caregivers are not independent of his/her agency[7].Thus a child's developmental process is influenced by the interaction between the agency of a child and that of caregivers (Bellanca, Biggeri and Marchetta, 2011).

This perspective allows us to examine capabilities and achieved functionings of the child in relation to those of his/her caregivers, and see how these capabilities and functionings could enhance each other.

Another concept that is central in the CA is that of conversion factors, or the characteristics at the individual level (e.g., sex or age), the social level (e.g., social norms), and the environmental level (e.g., climate. Conversion factors affect the process of capability expansion or restriction. These conversion factors influence the micro system, while the interaction of external capabilities and team agency in particular are pivotal to the process of the evolution of the child's capabilities. There is clearly an overlap between the notion of social conversion factors on the one hand and of the micro, meso, exo, and macro systems on the

[7] However, we argue that when it comes to very young children, it would be very difficult to assign an *intentional* component to mutual sharing. We would like to acknowledge that children's capabilities and agency develops over time. Therefore, for older children it is crucial to examine their participation, agency and choices. However, in the context of our article and the particular focus we have for children under the age of two, child participation would not be relevant.

other. Both concepts refer to the social, political, and cultural norms and structures that are dominant in a given period, and that affect people's opportunities and experiences, as well as the practices that permeate the community. In other words, the macro system affects children's development by influencing the interactions at the micro system level, while social conversion factors affect the ability of individuals to transform entitlements into opportunities. In the case of children, the choice is made through the team agency[8] of the caregivers.

Whereas the ecological model emphasizes interactions, the CA recognizes the capacity of individuals—including young children—to be agents. Agency is a measure of autonomous action and empowerment that can vary according to a person's age and experiences. Indeed, according to the CA "it is necessary to provide children with a choice space, instead of making choices for them, in such a manner that rational and reasonable decision making is favored" (Biggeri, Ballet et al. 2011, p. 27). Moreover, because the CA focuses on conversion factors, it allows for human diversity. In other words, rather than identifying and labeling separate groups, this framework addresses individual conversion factors as representing a multidimensional dynamic phenomenon with different types of limitations related to the person's "capability" to achieve various "beings and doings," or "functionings" that the individual values (Sen 1992, 1999). Thus, the CA can be a means of overcoming the "dilemma of differences," a term that refers to the "seemingly unavoidable choice between, on the one hand, identifying children's differences in order to provide for them differentially, with the risk of labelling and dividing, and, on the other hand, accentuating 'sameness' and offering common provision, with the risk of not making available what is relevant to, and needed by, individual children" (Terzi 2005, p. 444). Finally, the rights based approach, sheds insight about dynamics of duties and responsibilities of duty bearers. Once a child falls short on certain capability (by virtue of her/his young age), it is the legal and moral responsibilities of caregivers and societies to fulfill the right.

Thus, by combining the three approaches, we recognize that a child's growth is a process that is mainly determined by proximate relations (stimulation and support) and entitlements (access to food, sanitation, shelter). These relationships are, however, part of a broader picture comprising labor market regulations, social norms, and infrastructures. This layer affects the child's growth by making potentially achievable capabilities into achievable functionings.

The Capability Framework to Child Growth is different from the previous methods that were introduced earlier in this paper in different ways. The first difference is that it focuses on all children, malnourished or not. Second, it is interested in the distribution of positive abilities rather than ill health, hence it advances

[8] Team agency describes the circumstance where agency is expressed by a group (e.g. the child and her caregiver) and where the actions made by the actors are interdependent to such an extent that every contribution is essential for reaching the overall result (Bellanca et al. 2011)

the issue of inequality in child growth assessment. Third, it is capable of examining multiple dimensions and the plural space of outcomes (including capability to be nourished) as well as resources and contextual factors. Lastly, it is interested in evaluating not only the capabilities of the young children, but also those of their caregivers.

The diagram presented in figure 1 can be operationalized in several ways. Table 1 below presents a matrix of a list of resources, endowments, conversion factors, and capabilities for the child's healthy growth. As mentioned before, the presented dimensions, resources and conversion factors are introduced based on the expert opinion and using the human rights based approach.. As explained before, the concept of agency of caregivers is crucial to consider in applying our suggested framework and the list of capabilities. Although a child cannot choose to grow healthily, parents do have choices (given the availability of sets of opportunities) in providing a healthier environment during the pregnancy (with the exception of biological factors that affect pregnancies).

Table 1 - Key dimensions and indicators in children's healthy growth according to the Capability Approach – An example –

	Means to achieve **(commodities and resources)**	**Affected by**	**Freedom to achieve** **(capability set)**	**Achievement (status)**
	Endowments	***Conversion factors***	***Capabilities (achievable functionings)***	***Child's achieved functioning***
Child	- Access to food (breast milk, bottle milk, categories of food, diversity) - Milk intake in breastfeeding mothers (exclusivity/number/frequency of feeding) - Breastfeeding initiation in breastfeeding mothers - Skin-to-skin contact - Twin child - Size of the child at birth - GA at birth - Birth index (child order, parity, interval) - No. of children under age 5 in the HH - First 3 days was given milk or other things besides breastfeeding - Baby checked within 2 months after birth - Morbidity (fever, diarrhea, malaria, TB). -	- Gender - Religion - Ethnicity - Cast - Metabolism (rate) -	- Being able to develop well in utero - Being able to have adequate stimulation-cognitive, emotional, physical, social - Being able to explore safely - Being able to play - Being able to live in a safe environment (in- and outside the house) - Being able to grow well – physically - Being able to use the senses - Being able to live with parents or caregivers with love and care - Being able to receive national legal registration	- Being born safely (sex ratio, infant mortality, under-5 mortality) - Being adequately nourished - Being respected/understood Being emotionally, physically and socially healthy - Being explorative - Being playful - Being safe, trustful and secure - Being physically healthy - Being cared and loved with parents - Being legally registered

Household/ caregiver	- Access to food (different categories) - Access to safe drinking water - Access to sanitation - Access to reliable means of energy - Access to means of information (radio, TV, papers) - Access to family planning services and education - Access to means of mobility - Access to a source of livelihood - Access to shelter	- De jure state/type/ place of residence (capital, small city, town, countryside, urban, rural, state) - Culture (norms, values, beliefs, for example about use of colostrum) - Parents' social status (teen pregnancy, mother's anthropometric measures, mother's smoking, no. of people in the HH, employment) - Planned vs unplanned pregnancy - Timing of the first prenatal visit - No. of the antenatal visits - History of stillbirth - Barriers in getting health care (money, distance, no transport, can't go alone, no female provider, no drug available) - Barriers to receive family planning services - Mother is currently pregnant - Mother had postnatal complications - Morbidity (anemia, TB, malaria, etc. mother) - Domestic violence	- Being able to receive adequate prenatal care - Being able to receive childcare without discrimination (gender, race, disability, minority, family form) - Being able to live in a safe environment - Being able to move freely from one place to another - Being able to receive postnatal care - Being able to use breastfeeding services (checkups and counseling) - Being able to use growth monitoring services - Being able to use family planning services - Being able to be part of social networks and to give and receive social support - Being able to raise children and to take care of others - Being able to be sheltered - Being able to engage in leisure activities - Being able to exercise autonomy in allocating time - Being able to use oral rehydration - Being able to use medication when needed (TB, Malaria) - Being educated (caregivers)	- Being covered by health care services - Being safe and protected (mothers, caregivers) - Being mobile - Being nourished (mothers) - Being cared after birth with prenatal care - Using breast feeding checkup and counseling services - Using growth monitoring services - Using family planning services - Networking with friends, neighbors, and relatives - Taking care of children's needs (physical, emotional, social) - Living under an adequate shelter - Doing leisure activities (sport, cultural activities, etc.) - Allocating time to different needs of his/her own wellbeing and household members - Using ORS when needed - Using medication when needed

Community/ Society	- Breastfeeding counseling - Growth monitoring service and information - Information on oral rehydration - Child benefit safety net - Prenatal service - Postnatal service	- Providing services with respect and dignity Cost of family planning methods - Providing adequate public policies and services - Culture (norms, values, beliefs, for example about use of colostrum)		

In order to define different domains suggested in the matrix, next to a thorough literature review, an in-depth analysis has been done involving experts from different disciplines including child nutrition and growth, anthropology, social science and governance, and the Capability Approach[9]. The matrix could be read by rows and/or columns. The suggested list in the matrix is not intended to be definitive, and it could be modified and adapted to fit different contexts and circumstances. We also do not provide specific indicators (or their thresholds) for the dimensions presented in the table, as the contextual differences may or may not lead to identical indicators and thresholds (Yousefzadeh and Gassmann 2016). Nonetheless, it is important to note that "being adequately nourished" in this matrix refers to the anthropometric indicators defined by the WHO. In other words, children whose weight for age, height for age, and weight for height are below -2 standard deviations of the WHO's standard median are considered malnourished (de Onis and Blössner 2003; McDonald, Manji et al. 2013). In order to alleviate the potential pitfalls resulting from the application of this approach, the coordination between disciplines and specialists is essential as well as the integration between different datasets and data resources (e.g. administrative health care datasets).

5. FINAL REMARKS

Our aim in this paper was to apply the CA in examining child's growth. In defining a CA in relation to child growth, it is important to recognize other previous efforts that were sensitive to contextual factors and socioeconomic and structural dimensions in their analysis, and that elaborated on the deeper roots of inequalities in child growth. Some of those existing efforts focused on development and wellbeing rather than on child growth. Nevertheless, a careful review of those paradigms and their experiences is important, as they have some characteristics that are crucial to reflect on when suggesting that the CA be applied to child growth. We introduced a matrix that applies the CA to suggest several dimensions for child growth. The multidimensionality in our approach is at the input and outcome levels; i.e., under resources (endowments), conversion factors, capabilities and functionings, and agency. Applying the CA to generate this list of proposed dimensions implies that we made the crucial choice to use the notions of external capabilities and team agency in examining child growth. In other words, we evaluate children's achieved functionings (e.g., physical growth) together with caregivers' functionings.

[9] The matrix was discussed in a brainstorming session with a group of scholars from different fields (epidemiology, nutrition, political and social sciences) in a workshop (Toward a multi-dimensional approach to child growth and development Research Workshop) in Milan, February 23rd – 24th, 2015.

In our work, applying the CA has some advantages. It helps us identify and include dimensions from both an emic and an etic perspective; i.e. dimensions that are important from a caregiver's perspective and dimensions that are identified based on research and practice. The CA also enables us to shift the focus from a biomedical approach to child growth to an interpretative paradigm (Ibid). Furthermore, because the CA acknowledges human diversity, applying a CA to child growth allows us to focus on the uniqueness of the individual child and his/her needs without attempting to stigmatize the child by labeling him/her. Thus, when studying the social and environmental factors that shape children's growth, the CA enables us to recognize both the differences between children and the distribution of capabilities in policies that are related to child growth, thus helps to address issues of inequality and inequity. Finally, the CA is in strong synergy with the Convention of the Right of the Child (Biggeri and Karkara 2014) and generally with human rights approach (Nussbaum, 2006).

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